

What is claimed is:

1 1. A method comprising:
2 identifying statements in a first transaction that specify modification
3 operations that are commutative and associative;
4 combining the identified statements into one statement; and
5 submitting the one statement to a database system.

1 2. The method of claim 1, wherein identifying the statements comprises
2 identifying Structured Query Language (SQL) statements.

1 3. The method of claim 1, wherein combining the identified statements is
2 performed prior to submitting the one statement to the database system.

1 4. The method of claim 1, further comprising grouping plural transactions
2 into the first transaction.

1 5. The method of claim 4, wherein the identifying, combining, submitting,
2 and grouping are performed by a module separate from a database engine of the database
3 system.

1 6. The method of claim 1, wherein the identifying, combining, and
2 submitting are performed by a module separate from a database engine of the database
3 system.

1 7. The method of claim 6, wherein the identifying, combining, and
2 submitting are performed by the module without first accessing data in relational tables.

1 8. The method of claim 1, further comprising switching an order of
2 statements in the first transaction to place the identified statements adjacent to each other.

1 9. The method of claim 8, further comprising determining whether data
2 dependency exists between or among the identified statements prior to switching the
3 order of the identified statements.

1 10. The method of claim 1, wherein identifying the statements comprises
2 identifying statements $\langle t, b_1 \rangle$ through $\langle t, b_m \rangle$, m being greater than 1, where t represents
3 a set of one or more tuples, and b_1 through b_m represent respective modification
4 operations on the set of one or more tuples, and

5 wherein combining the identified statements comprises combining the
6 identified statements into statement $\langle t, c \rangle$, where c represents an aggregation of b_1
7 through b_m .

1 11. The method of claim 10, wherein combining the identified statements
2 comprises combining the identified statements into statement $\langle t, c \rangle$, where c represents
3 an addition of b_1 through b_m .

1 12. The method of claim 10, wherein combining the identified statements
2 comprises combining the identified statements into statement $\langle t, c \rangle$, where c represents a
3 multiplication of b_1 through b_m .

1 13. The method of claim 1, further comprising:
2 establishing multiple sessions with the database system, each session
3 associated with at least one transaction;
4 identifying transactions that operate on the same set of one or more tuples;
5 and
6 re-allocate transactions between or among the sessions such that the
7 identified transactions that operate on the same set of one or more tuples is allocated to
8 one of the sessions.

1 14. An article comprising at least one storage medium containing instructions
2 that when executed cause a controller to:
3 identify statements in a first transaction that specify modification
4 operations that are commutative and associative;
5 combine the identified statements into one statement; and
6 submit the one statement to a database system.

1 15. The article of claim 14, wherein combining the identified statements
2 comprises combining Structured Query Language (SQL) statements.

1 16. The article of claim 14, wherein combining the identified statements is
2 performed prior to submitting the one statement to the database system.

1 17. The article of claim 14, wherein the instructions when executed cause the
2 controller to further group plural transactions into the first transaction.

1 18. The article of claim 17, wherein the controller is separate from a database
2 engine of the database system.

1 19. The article of claim 18, wherein the identifying, combining, and
2 submitting are performed by the controller without first accessing data in relational tables
3 stored in the database system.

1 20. The article of claim 14, wherein the instructions when executed cause the
2 controller to switch an order of statements in the first transaction to place the identified
3 statements adjacent to each other.

1 21. The article of claim 14, wherein identifying the statements comprises
2 identifying statements $\langle t, b_1 \rangle$ through $\langle t, b_m \rangle$, m being greater than 1, where t represents
3 a set of one or more tuples, and b_1 through b_m represent respective modification
4 operations on the set of one or more tuples, and
5 wherein combining the identified statements comprises combining the
6 identified statements into statement $\langle t, c \rangle$, where c represents an aggregation of b_1
7 through b_m , the aggregation being one of addition and multiplication.

1 22. A system comprising:
2 an interface to receive first queries from a client system; and
3 a controller adapted to:
4 identify first queries that specify commutative and associative
5 operations, and
6 group the identified first queries into a second query.

1 23. The system of claim 22, wherein the statements comprises Structured
2 Query Language (SQL) statements.

1 24. The system of claim 22, wherein the controller is adapted to send the
2 second query to a database engine.

1 25. The system of claim 24, wherein the controller is adapted to group the
2 identified first queries prior to submitting the second query to the database system.

1 26. The system of claim 22, wherein the first queries are part of a first
2 transaction, and wherein the controller is adapted to further group plural transactions into
3 the first transaction.

1 27. The system of claim 22, wherein the controller is adapted to perform the
2 identifying and grouping without first accessing data in relational tables.

1 28. The system of claim 22, wherein the identified first queries comprise
2 statements $\langle t, b_1 \rangle$ through $\langle t, b_m \rangle$, m being greater than 1, where t represents a set of one
3 or more tuples, and b_1 through b_m represent respective modification operations on the set
4 of one or more tuples, and

5 wherein the second query comprises statement $\langle t, c \rangle$, where c represents
6 an aggregation of b_1 through b_m .

1 29. The system of claim 28, wherein c represents an addition of b_1 through b_m .

1 30. The system of claim 28, wherein c represents a multiplication of b_1
2 through b_m .